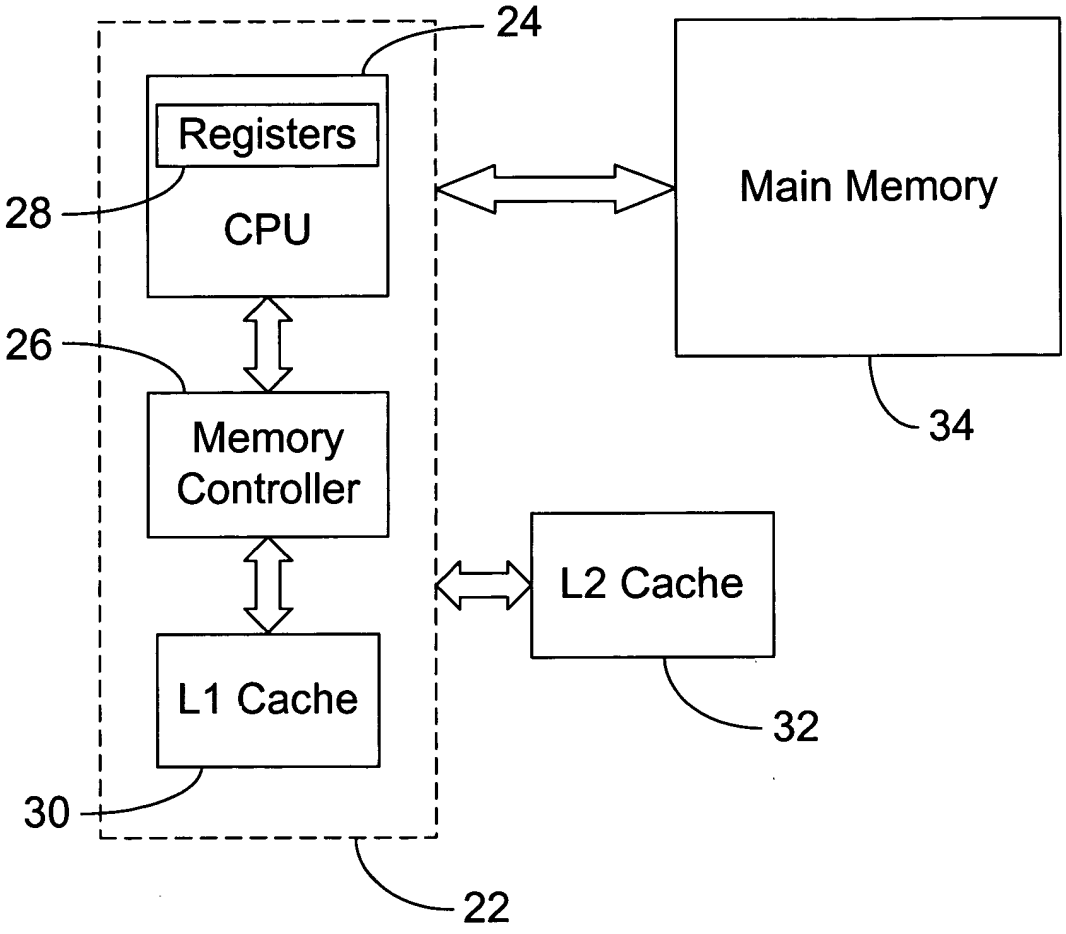


**Figure 1**
**(Prior Art)**

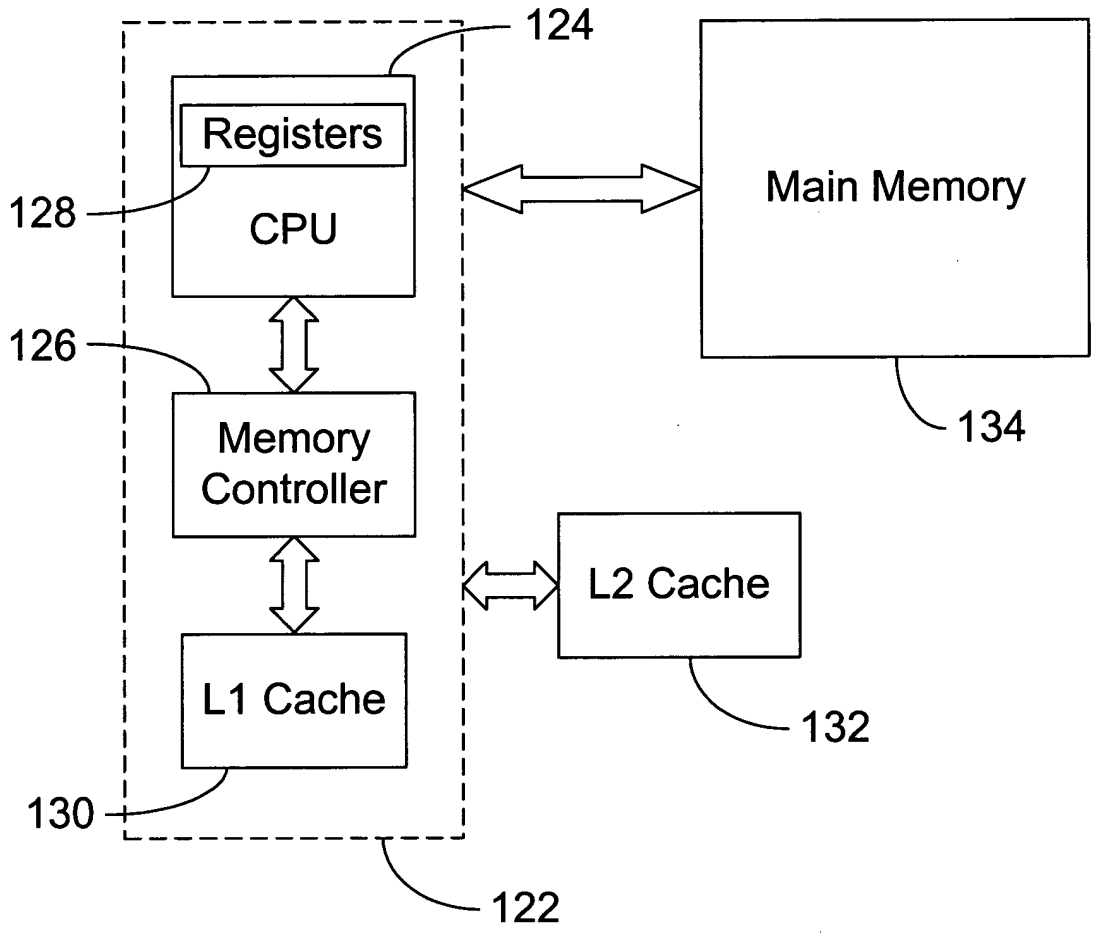
124
Registers
128
CPU
Main Memory
126
134
Memory
Controller
L2 Cache
L1 Cache
132
130
122

**Figure 2**

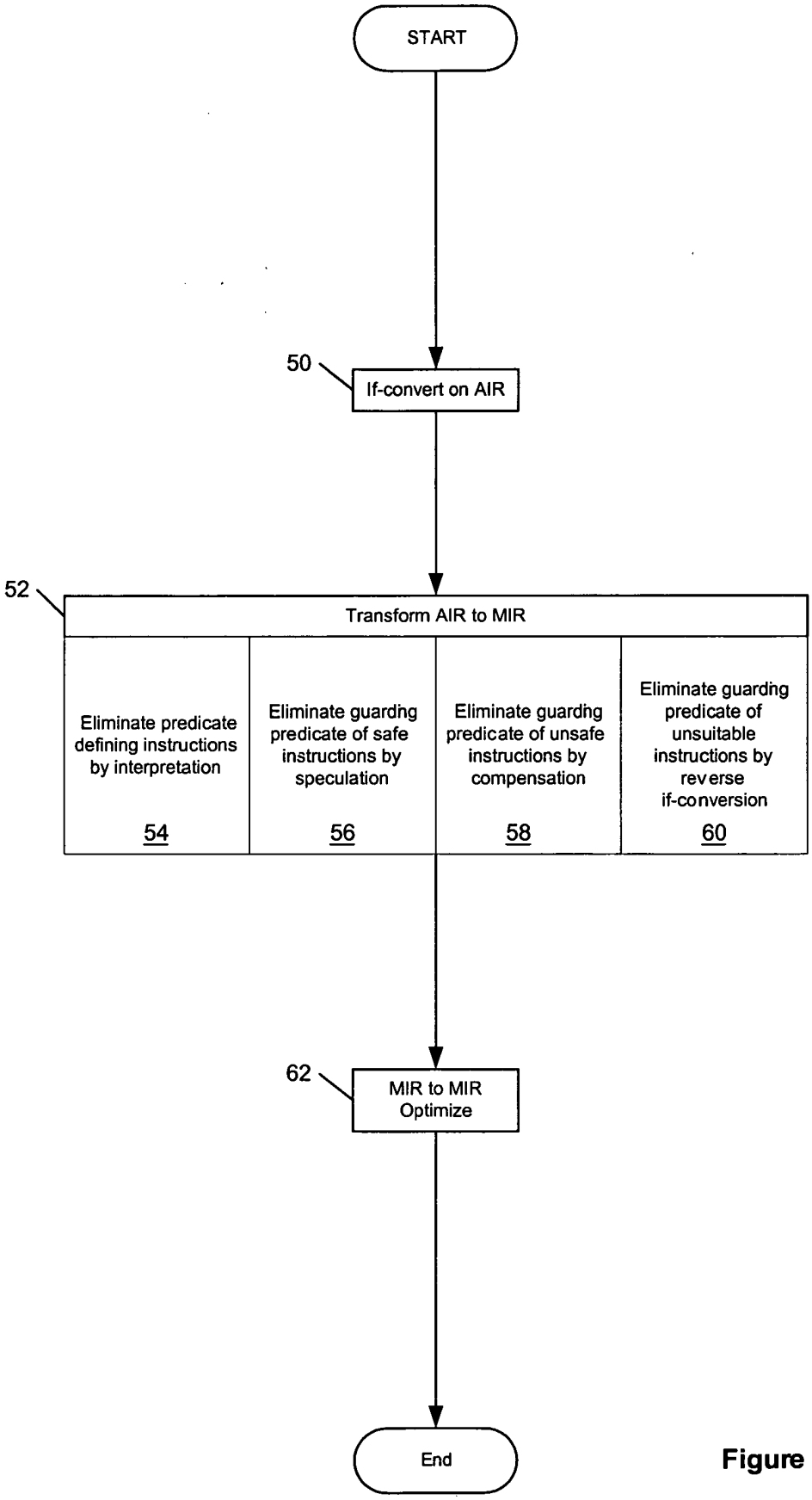
START
50
If-convert on AIR
52
Transform AIR to MIR
Eliminate predicate defining instructions by interpretation
54
Eliminate guarding predicate of safe instructions by speculation
56
Eliminate guarding predicate of unsafe instructions by compensation
58
Eliminate guarding predicate of unsuitable instructions by reverse if-conversion
60
62
MIR to MIR Optimize
End

Figure 3

DO 7504424 - 050701

200

```
      DO 65 I=1,NOPAR
      IF (VALUE(LOCV+I).EQ.AUNDEF) GO TO 62
      IF (IVCHK(LOCM+I).LT.0) GO TO 55
      IF (VALUE(LOCV+I).LT.0.0D0) GO TO 62
55    IF (ITAB(I).NE.0) GO TO 65
      ITAB(I)=IFMT(LOCM+I)
      GO TO 65
62    VALUE(LOCV+I)=DEFVAL(LOCM+I)
65    CONTINUE.
```

**Figure 4**

09764254 - 020704

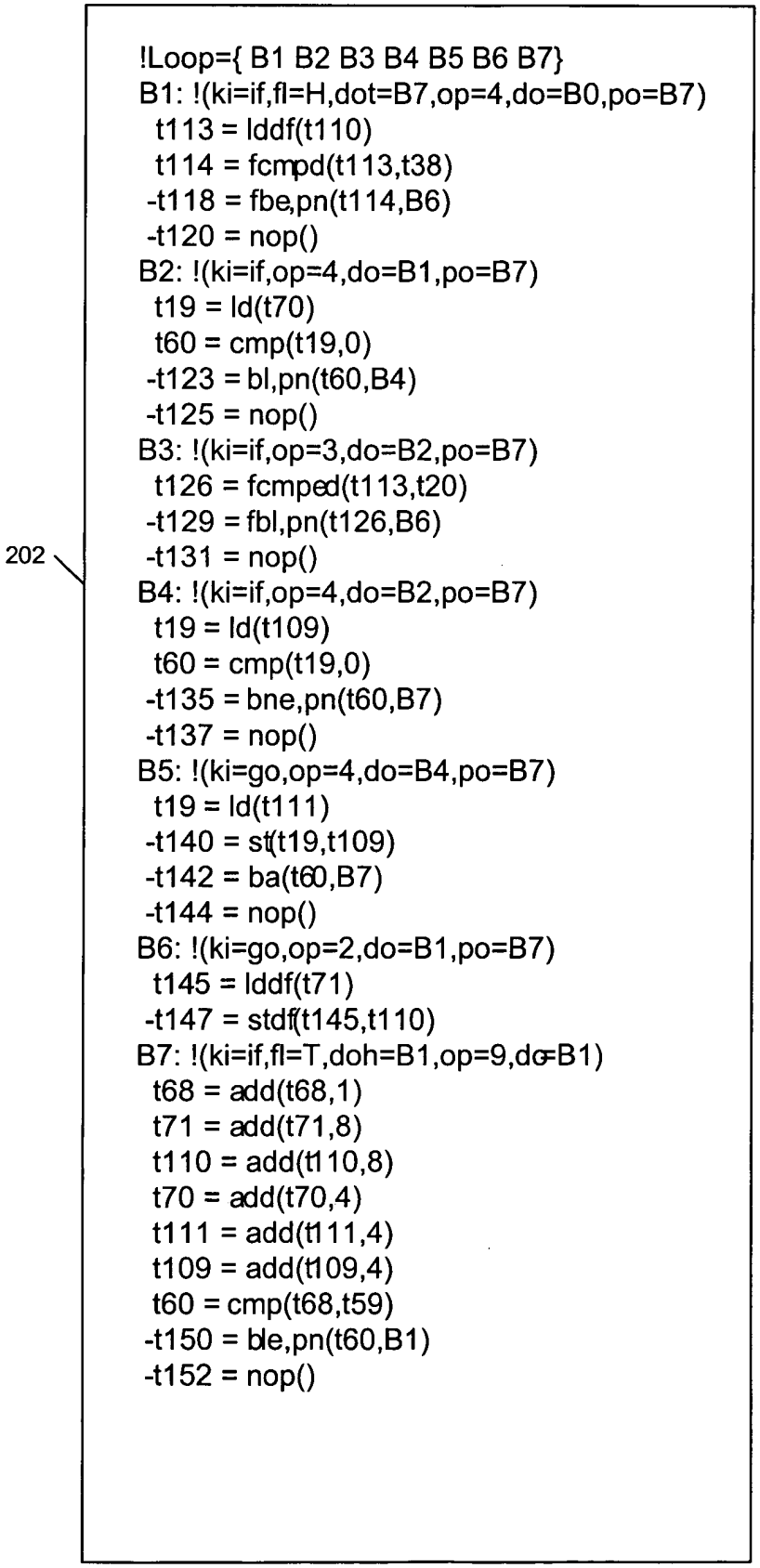


Figure 5

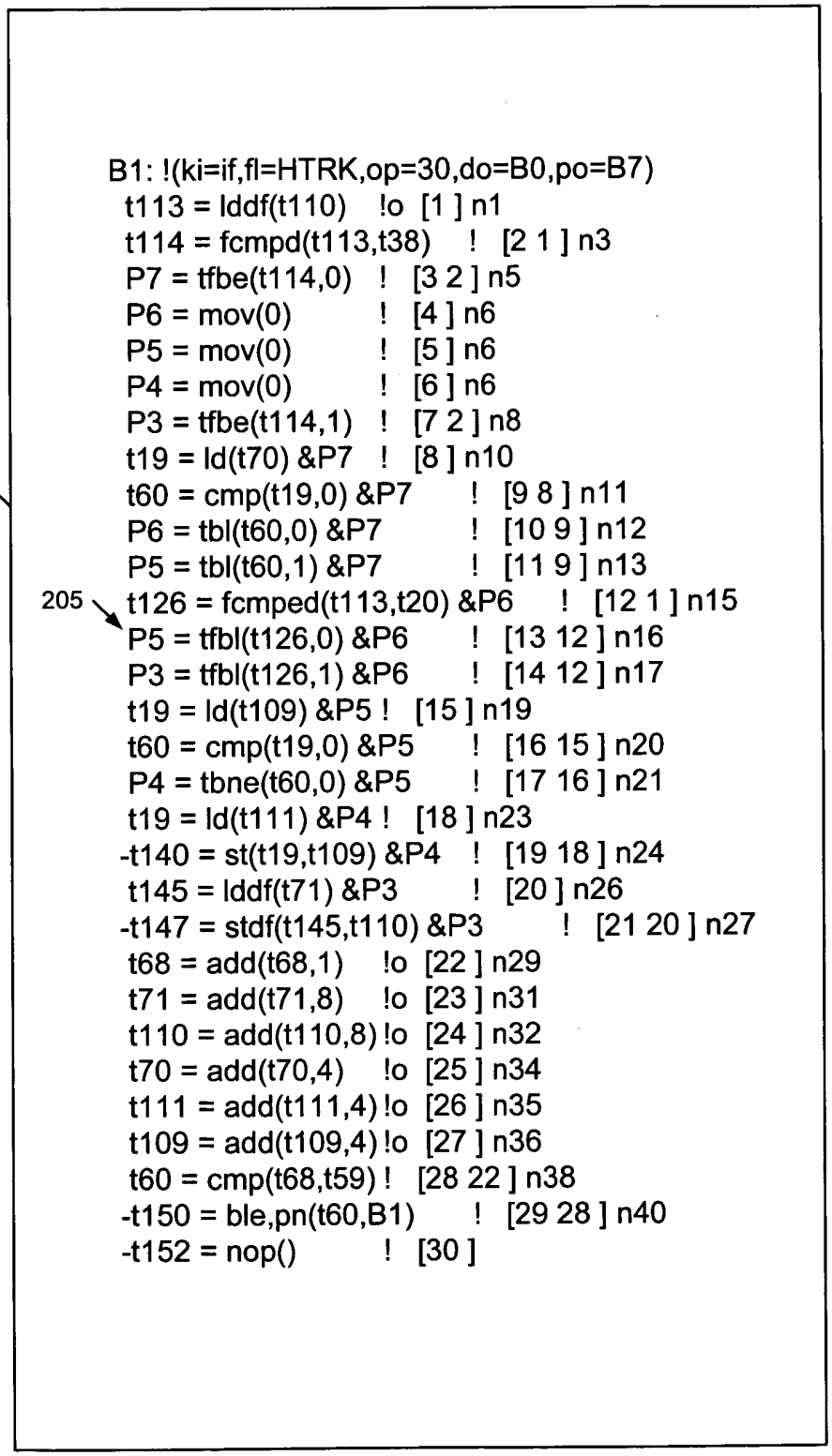
B1: !(ki=if,fl=HTRK,op=30,do=B0,po=B7)
t113 = lddf(t110) !o [1 ] n1
t114 = fcmpd(t113,t38) ! [2 1 ] n3
P7 = tfbe(t114,0) ! [3 2 ] n5
P6 = mov(0) ! [4 ] n6
P5 = mov(0) ! [5 ] n6
P4 = mov(0) ! [6 ] n6
P3 = tfbe(t114,1) ! [7 2 ] n8
t19 = ld(t70) &P7 ! [8 ] n10
t60 = cmp(t19,0) &P7 ! [9 8 ] n11
P6 = tbl(t60,0) &P7 ! [10 9 ] n12
P5 = tbl(t60,1) &P7 ! [11 9 ] n13
t126 = fcmped(t113,t20) &P6 ! [12 1 ] n15
P5 = tfbl(t126,0) &P6 ! [13 12 ] n16
P3 = tfbl(t126,1) &P6 ! [14 12 ] n17
t19 = ld(t109) &P5 ! [15 ] n19
t60 = cmp(t19,0) &P5 ! [16 15 ] n20
P4 = tbne(t60,0) &P5 ! [17 16 ] n21
t19 = ld(t111) &P4 ! [18 ] n23
-t140 = st(t19,t109) &P4 ! [19 18 ] n24
t145 = lddf(t71) &P3 ! [20 ] n26
-t147 = stdf(t145,t110) &P3 ! [21 20 ] n27
t68 = add(t68,1) !o [22 ] n29
t71 = add(t71,8) !o [23 ] n31
t110 = add(t110,8) !o [24 ] n32
t70 = add(t70,4) !o [25 ] n34
t111 = add(t111,4) !o [26 ] n35
t109 = add(t109,4) !o [27 ] n36
t60 = cmp(t68,t59) ! [28 22 ] n38
-t150 = ble,pn(t60,B1) ! [29 28 ] n40
-t152 = nop() ! [30 ]
204
205

**Figure 6**

```
B1:
!(ki=if,fl=HTRK,op=43,su=[B1,B8],pr=[B0,B1])
 t113 = lddf(t110)   !o  [1 ] n1
 t114 = fcmpd(t113,t38)    !   [2 1 ] n3
 P7 = mov(1)               !   [3 ] n5
 P7 = move(t114,0)!   [4 2 ] n7
 P6 = mov(0)               !   [5 ] n8
 P5 = mov(0)               !   [6 ] n8
 P4 = mov(0)               !   [7 ] n8
 P3 = xor(P7,1)      !   [8 4 ] n9
 t19 = lduwa(t70)    !   [9 ] n11
 t60 = cmp(t19,0)    !   [10 9 ] n12
 Q2 = mov(1)               !   [11 ] n5
 Q2 = movl(t60,0)    !   [12 10 ] n13
 P6 = movrnz(P7,Q2)        !   [13 4 12 ] n14
 Q2 = xor(P6,1)      !   [14 13 ] n15
 P5 = movrnz(P7,Q2)        !   [15 4 14 ] n16
 t126 = fcmped(t113,t20)   !   [16 1 ] n18
 Q3 = mov(1)               !   [17 ] n5
 Q3 = movl(t126,0) !   [18 16 ] n19
 P5 = movrnz(P6,Q3)        !   [19 13 18 ] n20
 Q3 = xor(P5,1)      !   [20 19 ] n21
 P3 = movrnz(P6,Q3)        !   [21 13 20 ] n22
 t19 = lduwa(t109)   !   [22 ] n24
 t60 = cmp(t19,0)    !   [23 22 ] n25
 Q4 = mov(1)               !   [24 ] n5
 Q4 = movne(t60,0)!   [25 23 ] n26
 P4 = movrnz(P5,Q4)        !   [26 19 25 ] n27
 t19 = lduwa(t111)   !   [27 ] n29
 t176 = lduwa(t109)!   [28 ] n24
 t176 = movrnz(P4,t19)     !   [29 26 27 ] n30
-t140 = st(t176,t109)       !   [30 29 ] n31
 t145 = lddfa(t71)   !   [31 ] n33
 t177 = lddfa(t110)  !   [32 ] n34
 t177 = movrnz(P3,t145)    !   [33 21 31 ] n35
-t147 = stdf(t177,t110)     !   [34 33 ] n36
 t68 = add(t68,1)    !o  [35 ] n38
 t71 = add(t71,8)    !o  [36 ] n40
 t110 = add(t110,8) !o  [37 ] n41
 t70 = add(t70,4)    !o  [38 ] n43
 t111 = add(t111,4) !o  [39 ] n44
 t109 = add(t109,4) !o  [40 ] n45
 t60 = cmp(t68,t59) !   [41 35 ] n47
-t150 = ble,pn(t60,B1)      !   [42 41 ] n49
-t152 = nop()         !   [43 ]
```

206

Figure 7

09784524.0207.04

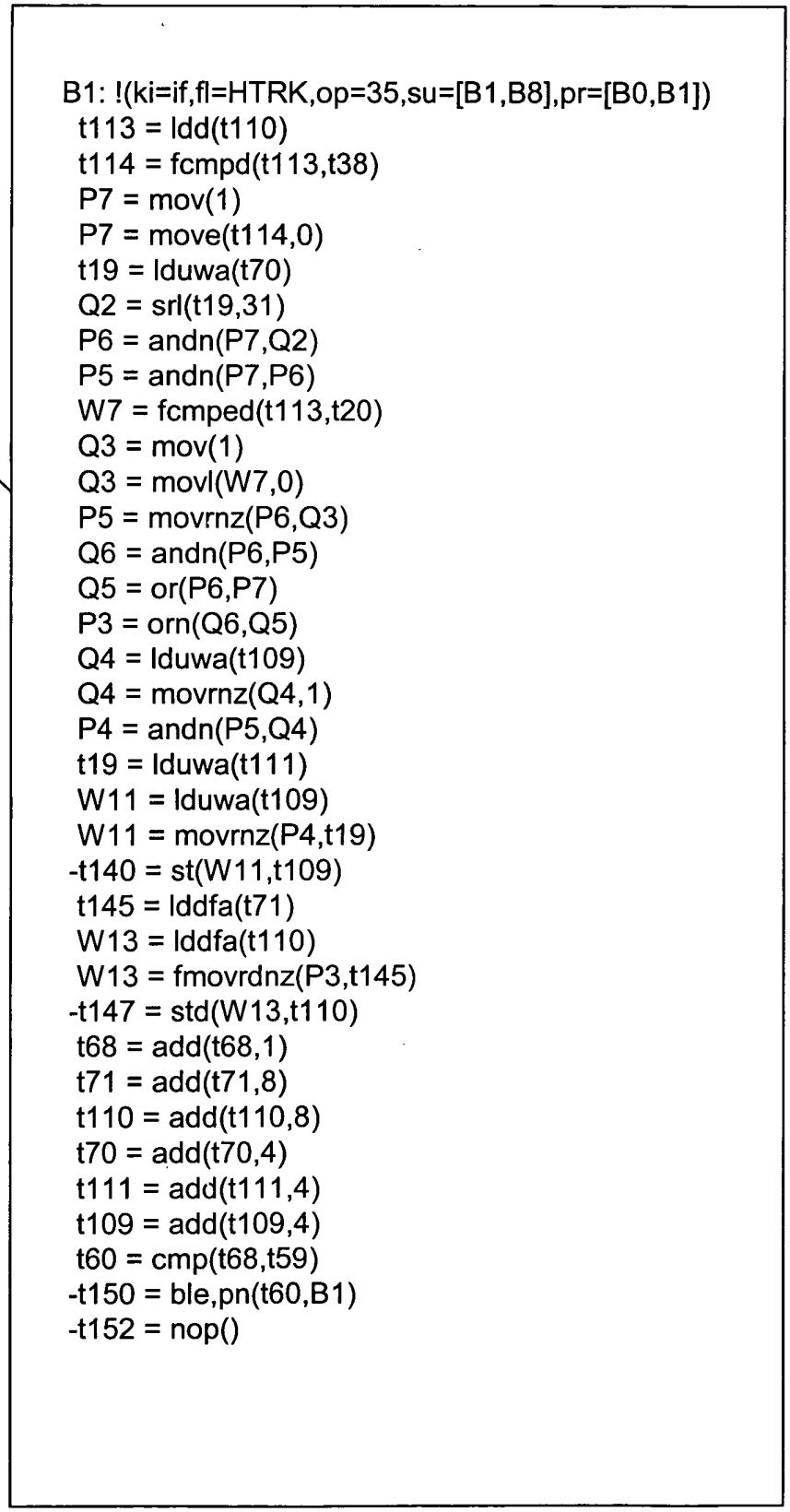
B1: !(ki=if,fl=HTRK,op=35,su=[B1,B8],pr=[B0,B1])
t113 = ldd(t110)
t114 = fcmpd(t113,t38)
P7 = mov(1)
P7 = move(t114,0)
t19 = lduwa(t70)
Q2 = srl(t19,31)
P6 = andn(P7,Q2)
P5 = andn(P7,P6)
W7 = fcmped(t113,t20)
Q3 = mov(1)
Q3 = movl(W7,0)
P5 = movrnz(P6,Q3)
Q6 = andn(P6,P5)
Q5 = or(P6,P7)
P3 = orn(Q6,Q5)
Q4 = lduwa(t109)
Q4 = movrnz(Q4,1)
P4 = andn(P5,Q4)
t19 = lduwa(t111)
W11 = lduwa(t109)
W11 = movrnz(P4,t19)
-t140 = st(W11,t109)
t145 = lddfa(t71)
W13 = lddfa(t110)
W13 = fmovrdnz(P3,t145)
-t147 = std(W13,t110)
t68 = add(t68,1)
t71 = add(t71,8)
t110 = add(t110,8)
t70 = add(t70,4)
t111 = add(t111,4)
t109 = add(t109,4)
t60 = cmp(t68,t59)
-t150 = ble,pn(t60,B1)
-t152 = nop()
208

Figure 8

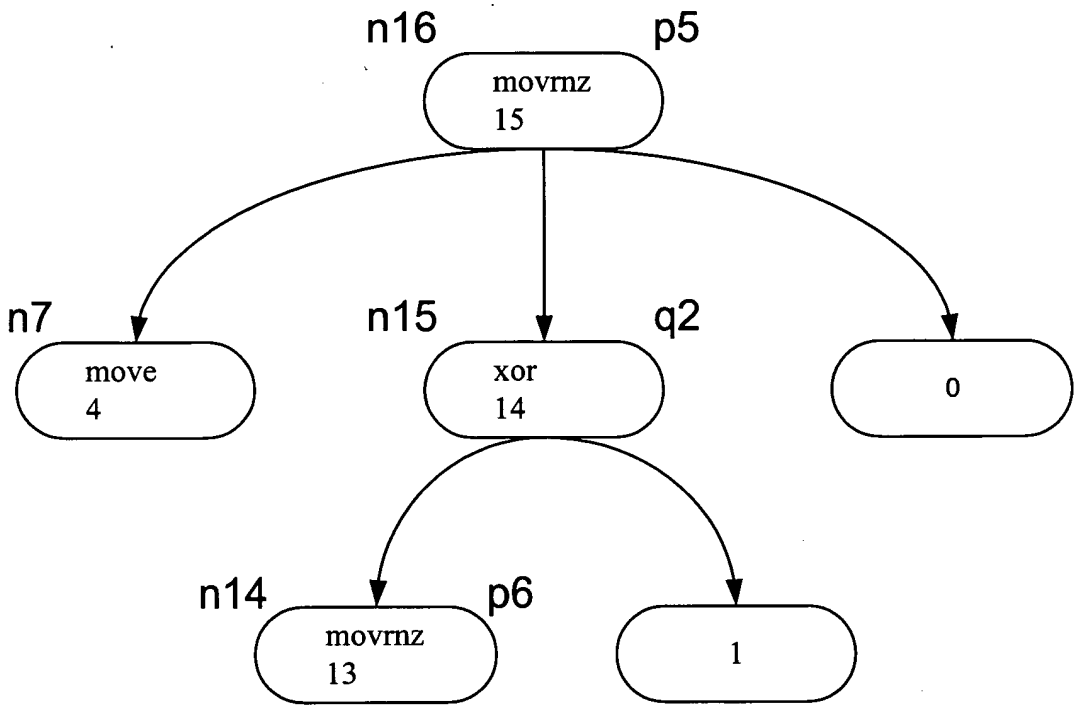


**Figure 9**

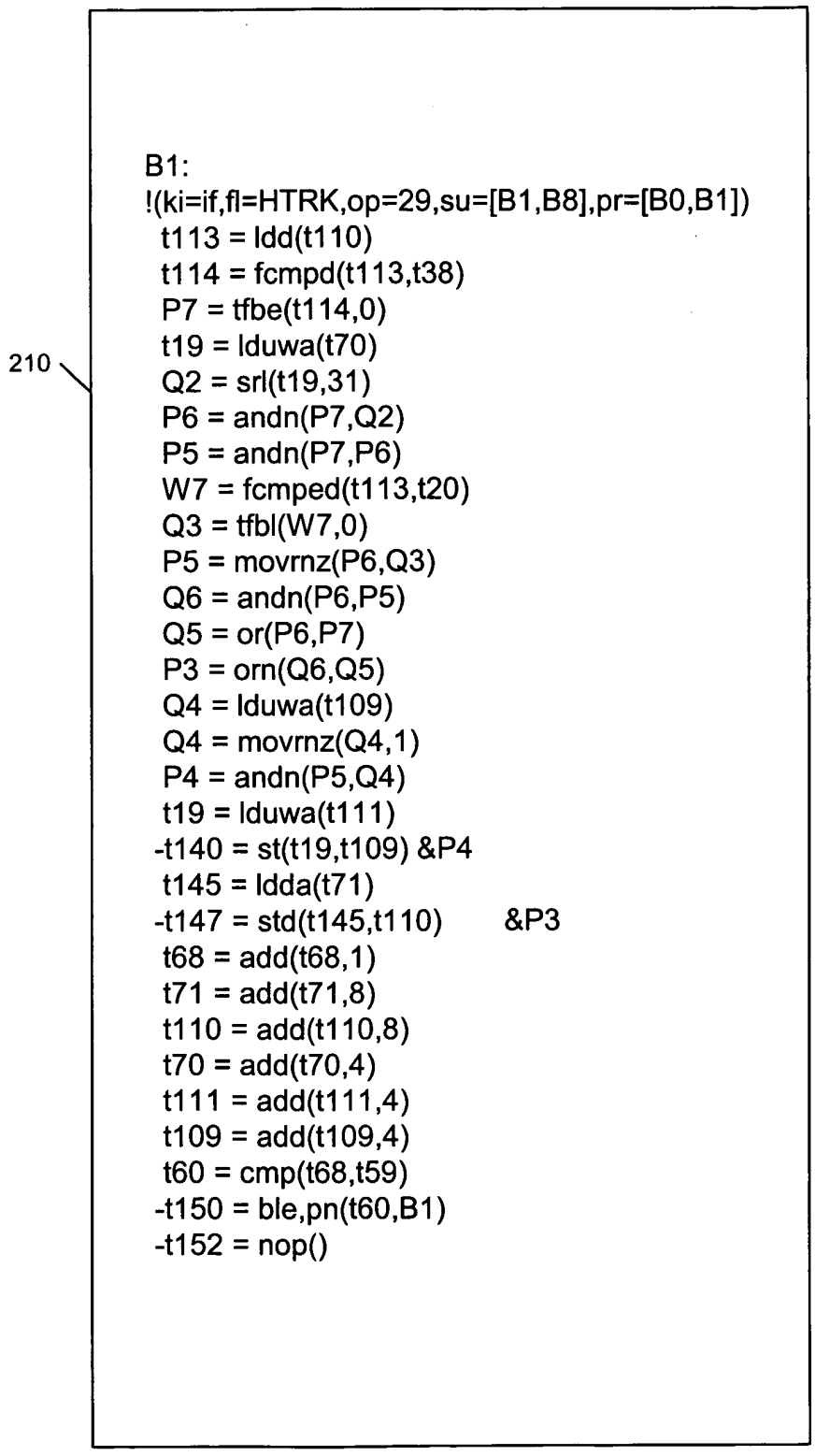
B1:
!(ki=if,fl=HTRK,op=29,su=[B1,B8],pr=[B0,B1])
t113 = ldd(t110)
t114 = fcmpd(t113,t38)
P7 = tfbe(t114,0)
t19 = lduwa(t70)
Q2 = srl(t19,31)
P6 = andn(P7,Q2)
P5 = andn(P7,P6)
W7 = fcmped(t113,t20)
Q3 = tfbl(W7,0)
P5 = movrnz(P6,Q3)
Q6 = andn(P6,P5)
Q5 = or(P6,P7)
P3 = orn(Q6,Q5)
Q4 = lduwa(t109)
Q4 = movrnz(Q4,1)
P4 = andn(P5,Q4)
t19 = lduwa(t111)
-t140 = st(t19,t109) &P4
t145 = ldda(t71)
-t147 = std(t145,t110) &P3
t68 = add(t68,1)
t71 = add(t71,8)
t110 = add(t110,8)
t70 = add(t70,4)
t111 = add(t111,4)
t109 = add(t109,4)
t60 = cmp(t68,t59)
-t150 = ble,pn(t60,B1)
-t152 = nop()
210

**Figure 10**